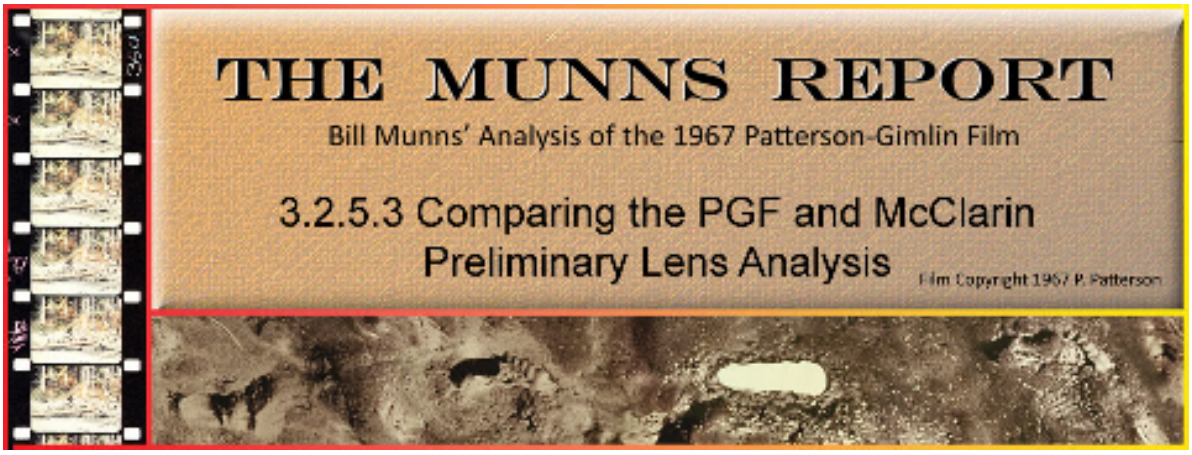

Release Version PART ONE
(incorporating minor revisions from the Preview Version)

Comparing the PGF (Patterson-Gimlin Film) with John Green's film of Jim McClarin, and a Preliminary Revision of the Lens Analysis are in this document. The document has been split into two sections, and this is PART ONE

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Introduction

In October, 1967, Roger Patterson filmed something walking through Bluff Creek, in Northern California. In the summer of 1968, John Green filmed Jim McClarin walking approximately the same path, at the same Bluff Creek location, to see if such a recreation filming would provide evidence to help resolve the PGF mystery. Just as the PGF itself is debated still, and it's mystery unresolved in any real world consensus, so the Green-McClarin footage is debated still as to how much evidence and what kind of conclusions can be drawn from the comparison of the two films. This aspect of my Report will explain the issues and considerations that factor into any comparison of these two films.

Above you see composite images of both films, showing the PGF subject's walk path in the lower right, and McClarin's walk in the upper panel. Both composites are referenced by the center group of trees on the far right. Scaling of the two composites is approximately correct, but this diagram is not set up for any actual height measurements of either subject.

Debt of Gratitude to John and Jim

To begin, we must express a sincere debt of gratitude to both John Green and Jim McClarin for making this film. In many ways, it is truly invaluable, and has some very significant potential to help us resolve the PGF mystery. Thank you, John and Jim. I also wish to thank both men for reviewing the material and offering their comments or thoughts on the matter.

In this review, John Green did ask me a direct and fair question. In essence, he wondered why this study of mine was important. It's a fair question, and I thought it deserved to be publicly answered.

A photogrammetry solution to the PGF film, with use of the McClarin film as supplemental data, will eventually allow us to model the site with a high degree of precision. As the site today has vastly changed, this may be the only way to accomplish a true digital model of the Bluff Creek site for further analysis. And a photogrammtery solution requires a solution to the cameras and lenses used in the films. Additionally, I raised the question that I felt the PGF was not filmed with a 25mm lens, and after that initial report, the issue came under considerable challenge, and so I promised to re-evaluate the issue. So I had an obligation to revise the study and correct any errors in my first analysis. I have seen some people raise a question and then just leave it hanging, with no more attention to a solution, and that I felt was not a responsible action.

Finally, I feel the cameras and lenses are vital pieces to the larger jigsaw puzzle that is the PGF mystery, and so we must solve each piece of the puzzle as best we can, and only after doing so, can we actually evaluate how important it is to the larger solution.

For these reasons, I chose to take the time and effort to work through this problem.

Why They Are Compared?

The principle intention of most comparisons between the two films is to try and gauge the height of the PGF subject as compared to Jim McClarin, who is of known height of about 6' 5" in boots (See Appendix 1 for Jim's description of his height. It is in Part Two of this release). So John Green (who was filming) tried to take a position as close as possible to where Roger was apparently filming (based on aligning landmarks from photos taken from the PGF), and then had Jim McClarin walk a similar path while John filmed. Given that McClarin had reportedly visited the site very soon after the actual filming report of October 20, 1967, and he saw some evidence of the trackway still there, he had some firsthand knowledge of the trackway path, and thus presumably could walk along a similar path.

For the resources they had, the men did an admirable job. Compared to today's analysis technology, however, there are differences in the two filmed events that we must evaluate as variables, to see if these variables impact on an analysis. Many previous comparisons have been flawed by a lack of consideration of the variables.

Among the variables needing to be evaluated are:

1. Were the two cameras in the same position and location? If not, how far off was Green's camera from Patterson's? Does any discrepancy in position or distance influence the attempt to measure the PGF subject height by using McClarin's known height?

2. Did the two cameras have the same lens? If not, how far off are the respective focal lengths? How does this affect calculations of height?

3. Did McClarin walk the exact same path? If an answer is offered, how can we verify such?

The Evidence To Use in Analysis

Scans of the PGF are well established in research work. The ideal scan however, is a true full frame scan from a contact print, and most scans thus do not qualify. Jeff Glickman did such a scan for the NASI Report effort in the 1990's, but those scans are not available now to the research community. There is also a question of their image file format, and if it would be compatible with current image analysis software.

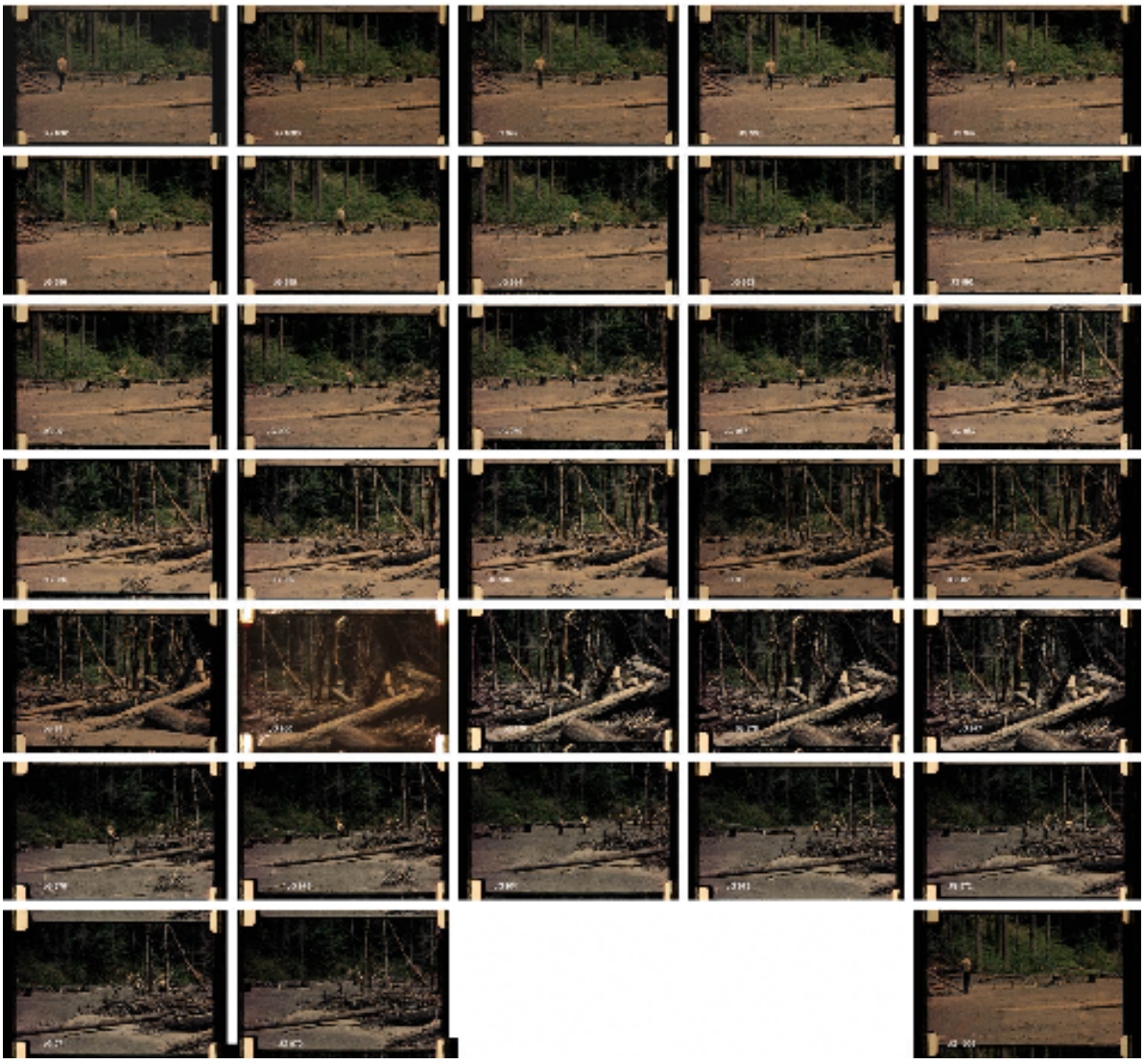
I did a true full frame scan in June, 2009 from the Patterson Archive Copy of the PGF, and it is suitable for research analysis.

Scans of John's film - So far, I am only aware of two scans from John's footage. And John has stated that he has not made any film copies. One known scan was to TV format for the Legend Meets Science (LMS) program and DVD. It has most, but not all, of the walk recreation.

LMS TV example shown:

The second scan was by me, in Feb. 2009, but I only scanned selected frames to help my analysis of the landscape for my intended digital site model and photogrammetry analysis. I had no intention then of scanning the entire walk sequence, and did not have the time either (since I was scanning the full PGF and some additional items, like the 202 frames of trackway footage).

The inventory of scans I did are shown as follows:



I hope John's entire film can one day be scanned at high resolution, every frame, but for now, what we have to base research analysis on is the LMS TV scanned sequence and my small collection of scans. Mine are the highest resolution, but the LMS scan segment is more complete, so both are used for various types of analysis.

Munns Scans (example shown. below left):

The two scan versions compared (above right), to show LMS version cropping.

Note that the actual image frame line is the yellow dotted line on the left image. The scanning gate I made was not originally intended to scan into the side sprocket regions, so the edges of the scan gate somewhat obscure portions of the detail of the scan on the far left margin of the images. But the image is verified as to extending out that far.

John's Three Camera Positions

In the film images I scanned, there were images from the walk sequence, plus some shots of Jim McClarin and two other young men at the site, just looking around. What is interesting, and in all likelyhood unintentional, is that these segments were taken from three varied camera positions, and the differing positions have some potential for the digital site model of Bluff creek, which has been my intention for so long.

One usage of this is to have an estimator of the various distances the assorted landscape objects are from camera, by anchoring the two photos on the most distant landscape object, and then seeing how much various object reference points change in height from one image to the next.

Analysis of these slightly varied camera positions may not impact on the PGF-McClarin comparison, but the data is still being evaluated for possible use.

16mm Film Image Frame Sizes and Formats

This issue needs foundation information, because while the PGF has a conventional (camera standard) aspect ratio for the camera used (A Kodak K-100), John's footage of McClarin has an odd image frame aspect ratio, specifically matching the magazine aperture of a 50' Magazine-type 16mm camera. This is odd, because stock cameras do not create images of this nature. And this odd frame shape impacts on the study significantly.

A few terms need definition, for readers not well acquainted with 16mm film cameras.

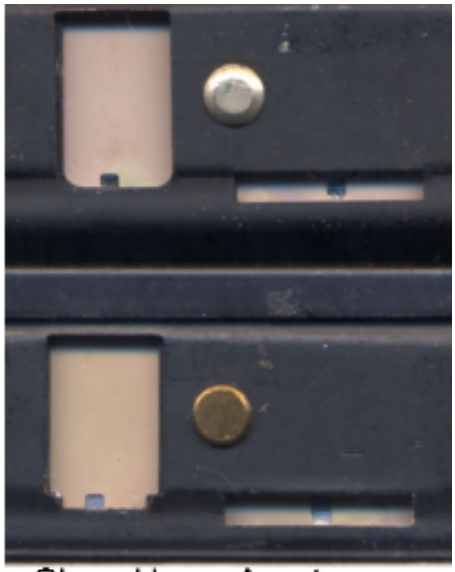
The "Frame Aspect (or aperture aspect)" is the ratio of image width to height. 4:3 , also described as 1.33:1 (capturing an image of about 0.400" wide by 0.300" high) was the standard frame image of regular 16mm film. Wider screen aspect ratios are 1.66:1, 1.85:1 and even 2.35:1 for super wide screen. HD Video today has a 16:9 aspect ratio.

The "Aperture" is an opening or window in a metal part of the film gate, to allow light through the lens to expose the film.

A standard camera has one aperture plate and window, on the camera body, in the film gate. But a 50' magazine type camera has two aperture windows, one on the camera aperture plate, and one on the front of the magazine housing which holds the film inside (shown below).

50' 16mm Film Magazine

Front showing Aperture and pulldown slot

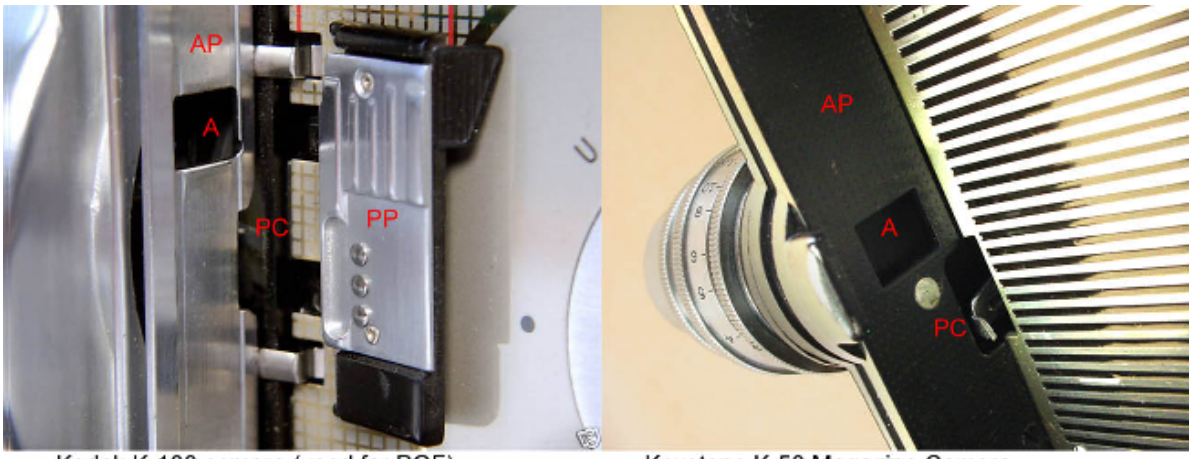

Close Up on Aperture

Kodak and Ansco Types shown

The "Film Gate" is the part of the camera which has the "pulldown claw" (the mechanical arm that pushes into a sprocket holes and pulls the film down to the next frame position for exposure), and the aperture window (which allows the light from the lens to expose the film). A regular camera also has a back plate, sometimes called the "pressure plate" which helps hold the film securely in the gate, so it doesn't move when the shutter opens and the exposure is made.

A magazine-type camera has a gate and a pressure plate, but it is inside the magazine, behind the magazine aperture plate and window.

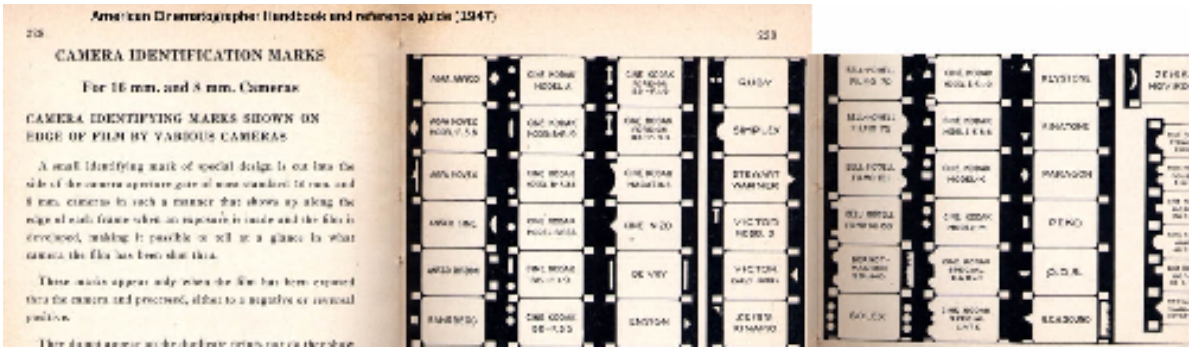
The diagram below illustrates the opened film gate of the K-100 camera (the type camera used for the PGF), and shows the camera aperture plate of a Keystone K-50 magazine type camera, which does not have the pressure plate on the camera.



Kodak K-100 camera (used for PGF) Keystone K-50 Magazine Camera

AP- Aperture Plate A - Aperture PC - Pulldown Claw PP - Pressure Plate

The "Camera Identification Mark" is an odd and distinctive shape (which may be made by a cut or machined shape in the aperture plate to one side of the regular frame window, or a tab added to the edge of an oversized aperture), and it causes the exposure of light on the side of the film, between the sprocket holes, in the shape of the notch or pattern. Each camera had its own shape, as the chart below shows. The K-100 camera (above) has such a notch, in the lower right corner of the aperture window. This exposed pattern is outside the projection window, so it never appears when a film is projected, or transfered to TV, and it may not show on a film copy, if the copy process masks off the sprocket side areas (some copy processes do, others do not).


CAMERA IDENTIFICATION MARKS

For 16 mm. and 8 mm. Cameras

CAMERA IDENTIFYING MARKS SHOWN ON EDGE OF FILM BY VARIOUS CAMERAS

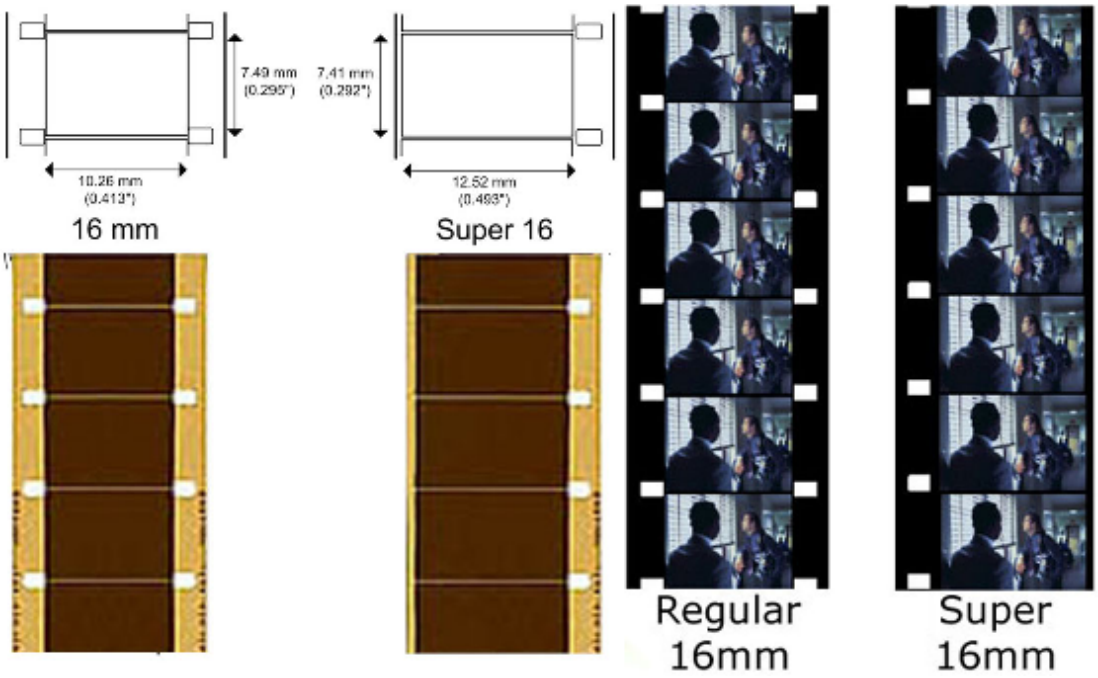
With regular cameras, the aperture plate and the window pattern (with ID Notch) all expose onto the film. With the magazine camera, the magazine aperture window needed to be widened, with opening into the sprocket side areas, so the camera ID Notch could expose the film.

So the magazine was designed with a wide aspect ratio, greater width than the standard film aperture, to allow for these exposures of camera ID notches.

And some ingenious filmmakers of olden days took this curious design and found a way to make a simple modification produce a 16mm widescreen image, as widescreen viewing became popular. All they needed to do was take a magazine type camera and modify the film gate camera aperture (by filing, machining, or such) so the camera body aperture was enlarged, (however crudely or irregularly) and then let the wider magazine aperture define the film exposure. Precision was not required because the magazine aperture had a precise shape already.

Now to appreciate the significance of this, we will look at the various 16mm film image shapes.

Standard 16mm Image Frame Aspect vs Super 16mm Image Frame Aspect



"Super 16mm" is a factory design aspect, which shifts the film image off center, into one side of single perforated film where an optical sound track would go on a release print. But since Super 16mm was intended to be transfered to either Video or blown up to 35mm widescreen, the sound track is added later in the process.

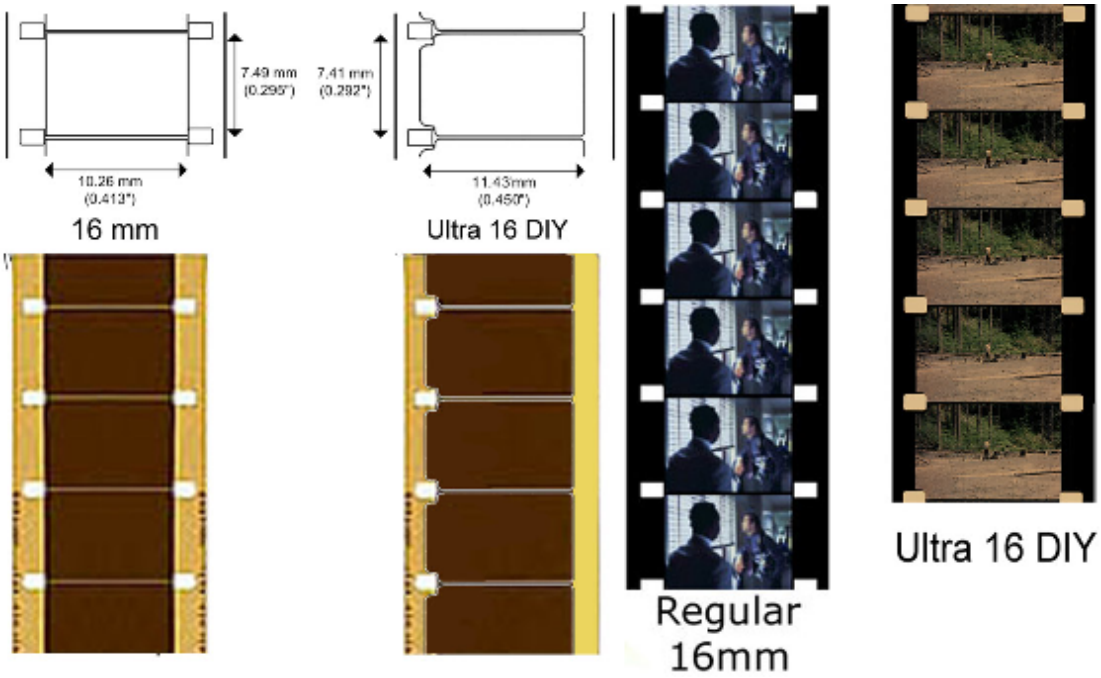
The result of shifting the film aperture to one side means the standard lens mount on camera is off center, and the resulting image will likely get more peripheral distortion on one side of frame than the other. So to properly configure a Super 16mm camera, not only must the aperture window be widened to one side, but the actual lens mount on the camera body must be shifted to re-center the lens on the new aperture position. So once modified, a Super 16mm camera can only film Super 16mm format. The modification requires manufacturer precision.

I referenced this so there would not be any confusion of whether Super 16mm is the same as Ultra 16mm. It is not.

Ultra 16mm Image Frame Aspect
(using a magazine camera aperture)

"Ultra 16mm" was a tribute to the inventive mind of camera users, who had experience with magazine type 16mm cameras. The magazines themselves have a wider aperture on the magazine so instead of a standard camera aperture of about 0.400", the magazine aperture is 0.450" wide.

The ingenuity of some camera user (I regret that we can't identify the first person to figure this out) was to take the camera aperture plate and machine, file, or grind it to open its width, and let the full magazine aperture show through, and create a somewhat wide screen effect. Nothing else about the camera needed changing, so it was a simple and ingenious way to get an apparent "wide screen" effect on 16mm film. But this was a "Do It Yourself" type modification, not a factory design. Camera owners would do the modification themselves or have a friend do it. Part of the beauty of this method was that precision machining was not necessary. If the aperture shape was rough, irregular, or otherwise uneven, as long as it was wider than the magazine aperture, it wouldn't show, and the results would have a professional wide screen look.



Ultra 16mm Image frame Aspect (using a regular 16mm camera)

In my research, I have read about professional Ultra 16mm modification, which widens the camera aperture in both sides into the sprocket area, keeping the lens centered. This would produce an image which could be used as standard 16mm aspect, for regular projection, or blown up to 35mm as a wide screen effect by cropping the top and bottom and using the wider than normal width between the sprockets. To widen the aperture on a regular camera for this effect, precision machining (probably with a mill) was necessary, to get a precise shape and true straight edges. So this would have been a more professional conversion, so a non-magazine-type camera could do an ultra 16mm effect.

But the film of McClarin walking, taken by John Green in 1968, shows an exact magazine shape exposure, leading us to conclude the camera was modified to DIY Ultra 16mm.

What is the significance of all this?

Whereas John Green's footage of Jim McClarin was filmed with a camera modified to allow the full magazine aperture shape to define the filmed image of McClarin, the Keystone camera John recalls using for that filming is a standard Keystone K-50 camera. This discrepancy challenges the recollection of the stated camera being used to accomplish the filming of Jim McClarin.

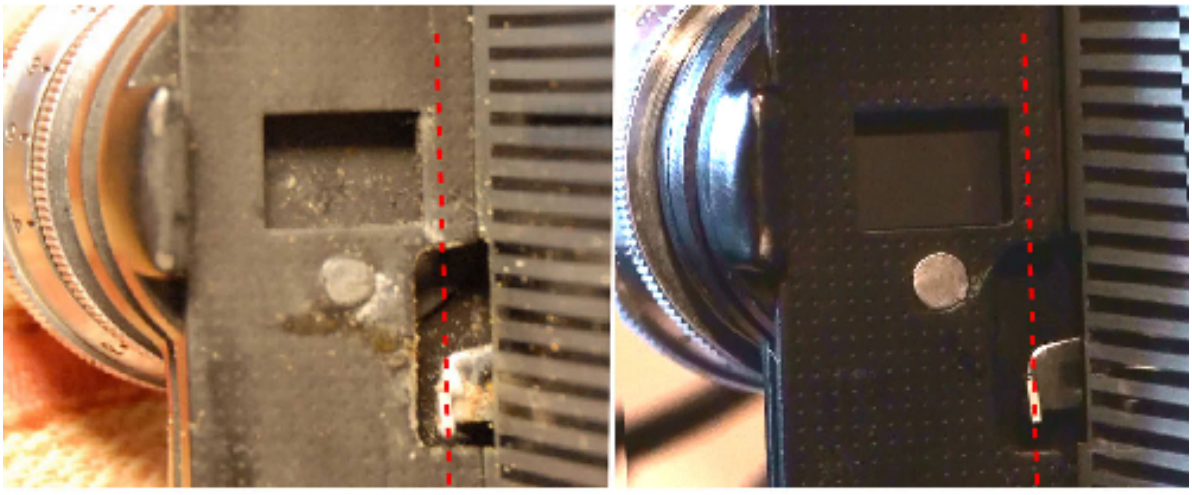
To identify the filming camera, what we need is a camera with a modified camera aperture plate, so that the full magazine aperture shape can show through and expose the film according to that wide and odd shape.

John's Camera - Recollection vs Mechanical Fact

It is John's recollection that he specifically bought a Keystone K-50 magazine type camera, which he still has today, to film the McClarin walk in 1968. So it is his recollection that this camera took the McClarin footage. But from an evidentiary standpoint, we must weigh mechanical fact against recollection, and mechanical fact must prevail.

John's camera has a stock aperture. It has been compared to another K-50 model Keystone camera recently purchased (by several BFF members generously helping advance my research), and shown here.

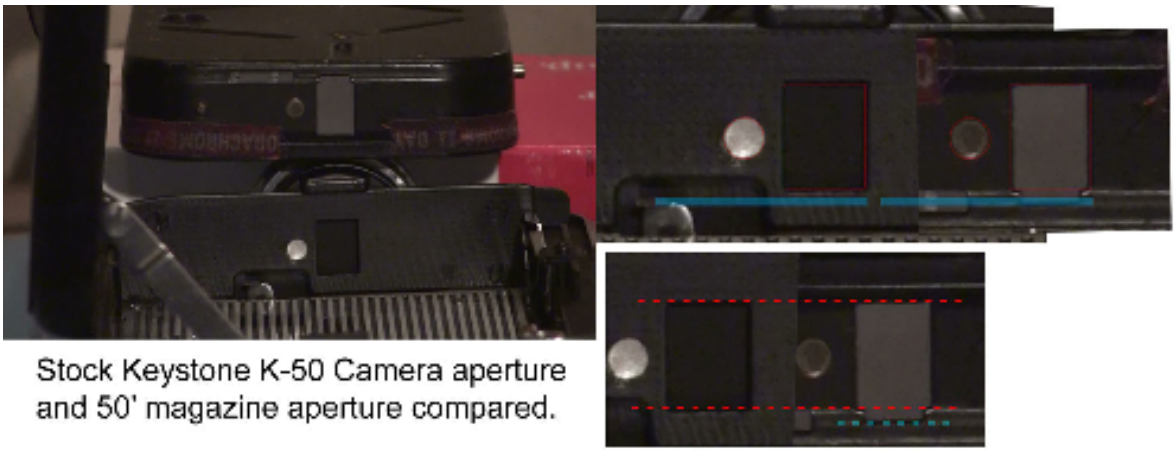
John Green's Keystone K-50 camera (left) and Research Keystone K-50 camera (right)



The red dotted line is the sprocket pulldown line, which is outside the aperture openings.

Above left is John's actual camera, and above right is a research camera purchased for this analysis. The red dotted line is the sprocket hole pulldown line, and we should see it inside the aperture, so image could be exposed into that area. But the camera doesn't allow this.

This research camera allowed me to verify that John's camera has a stock aperture as well, and the aperture size, compared to the aperture size of a standard film magazine, shows that the camera aperture is smaller in width than the magazine.



Stock Keystone K-50 Camera aperture and 50' magazine aperture compared.

In the above diagram, I photographed both the opened camera and a magazine in the same photo, aligned exactly away from camera to insure the camera aperture and magazine aperture would scale equally in the photo (left image). The top right aligned the two aperture images with the solid light blue line, which is the axis of motion for the pulldown claw.

The lower right image has two red dotted lines showing the camera aperture edges, and the dotted blue line show how much more magazine image area would be exposed on film if the camera aperture window were larger.

A second comparison was made, between the Keystone K-50 camera and two other Magazine type cameras, a Bell & Howell 200, and a Cine-Kodak Magazine 16mm. In this comparison, I placed a dime against the aperture plate of each, so I could use the dime as a scaling measure to help insure the images were correct in proportion to each other, and thus aperture window comparisons were fair and reliable.

In the chart below, the Bell & Howell 200 model camera is on the left. The Keystone K-50 is in the center. And the Cine-Kodak Magazine camera is on the right.

Once I aligned the three photographs of these camera apertures, I repeated the three photo group four times down the chart, showing various reference measures (with a blue dotted line).

Line "A" shows the reference lines for the dime, to check scaling and position of it.
Line "B" shows the reference line to the pulldown claw, because we would expect that to be standardized to the film sprocket hole specifications, and thus consistent on all cameras.
Line "C" shows the reference to a metal "button" on the aperture plate which has a corresponding reference button on the magazine and those two buttons make contact when the magazine is seated in the camera for use.

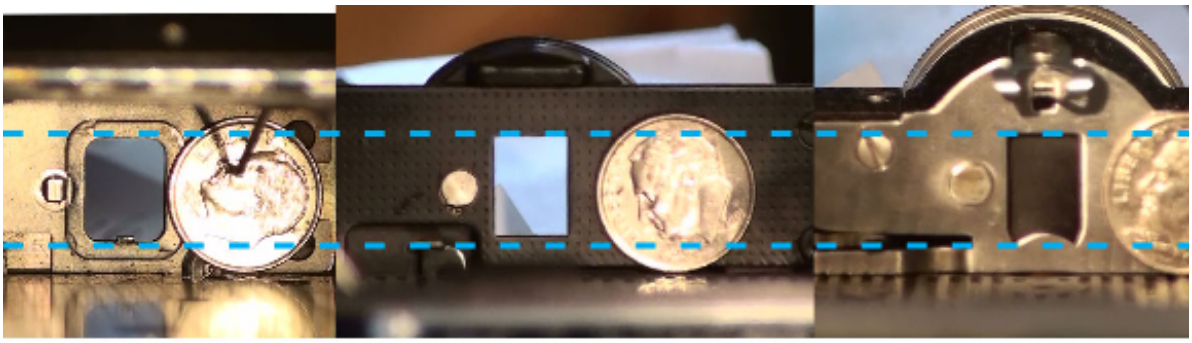
Line "D" shows the reference lines to the width of the aperture plates.

Comparing the aperture plate and window of three magazine cameras

Bell & Howell 200	Keystone K-50	Cine-Kodak Magazine
20MM Super Comat	25mm Cine Raptor	Kodak Anastigmat 25mm

Line “A” shows the reference scaling using a dime against the aperture.
Line “B” shows the reference line at the pulldown claw mechanism.
Line “C” shows the reference line at the magazine “button” which docks with a corresponding button on the magazine.
Line “D” shows the aperture width, and the lower line is where we should see a camera ID notch or tab exposure area.

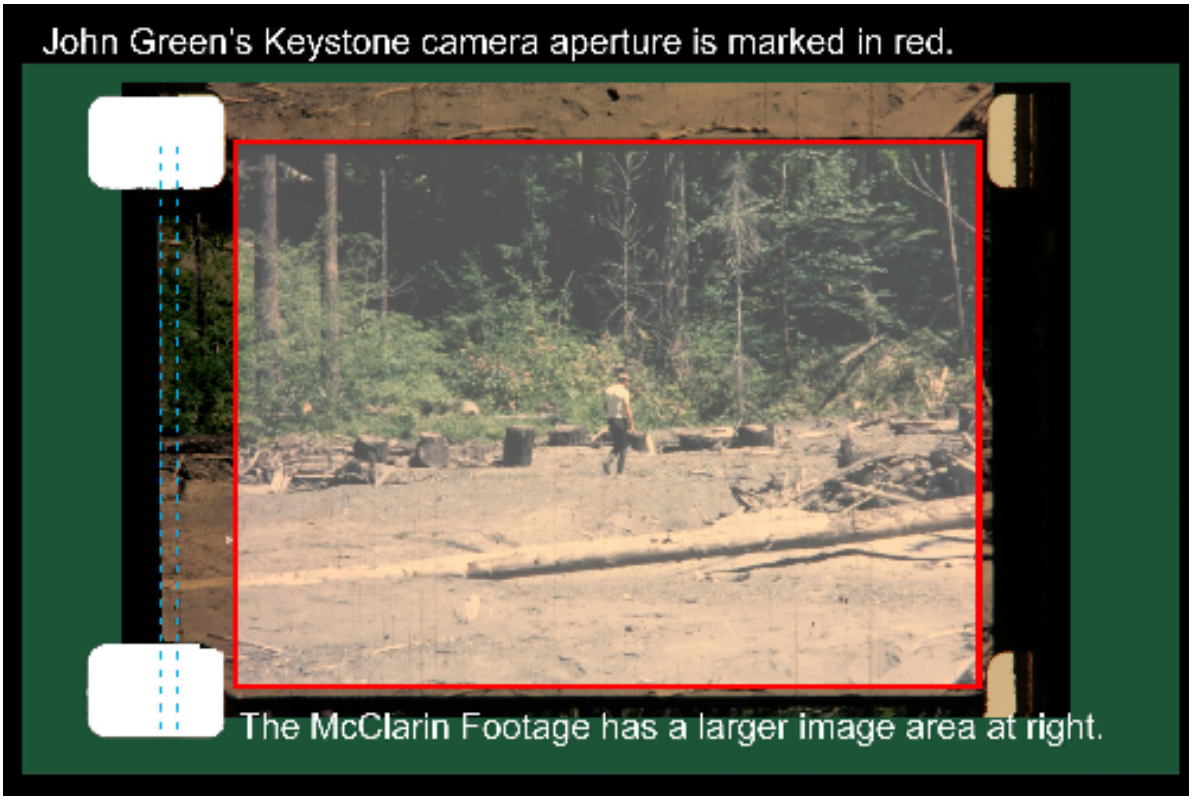
Next, I am repeating the Line "D" portion, slightly more enlarged, showing the aperture sizes. The Keystone camera aperture does not appear as wide as the other two, and thus doesn't expose image or light into the region between the sprocket holes, as the other two cameras would.



This enlarged view shows the Keystone camera (center) has an aperture which does not expose the film into the side area between the sprocket holes, as the other two cameras do.

This comparison shows the Keystone camera has an aperture window too small in width to normally expose film into the side sprocket area of the film stock, as the two other camera must, to insure their Camera ID shapes are exposed onto the film. And this exposure into the side image area was done on the footage of McClarin, as illustrated on the next page.

In the image below, I compare the Keystone aperture size to the McClarin image on film, with the standard Keystone Aperture shown (approximated) in the red line. The actual scan shows image area well outside that shape, on the left side, between the sprockets. The dotted blue lines show the scan portion partially less clear and needed some image adjustment to bring to full clarity. But that area is verifiably exposed image area.



Now, the mechanical fact is that the frame exposed onto John's film of McClarin has a larger image exposure than the aperture window of John's Keystone camera. Regardless of any lens on the camera, it is the relationship of size between the camera's aperture plate and the magazine aperture plate which produces an incompatible combination that would not expose the film well into the side sprocket area, as we see on the McClarin footage. We must conclude that this is simply not the camera which took the film of McClarin.

This is an awkward situation, because I personally have a very high regard for John's integrity, and admire the immense knowledge he has on the subject of the PGF. He was there that day, 43 years ago, when the PGF was first screened, and he's been a vital contributor to the research of the film ever since. So this conclusion is not intended to in any way diminish his contributions to the film study, nor is it intended to challenge his personal integrity in any way. But the inescapable conclusion we must draw is that the mechanical fact must prevail over recollection, and the recollection must be set aside as incorrect. The Keystone camera John has simply could not have taken the McClarin footage.

The 25mm Lens Controversy

In my analysis of the lens on Patterson's K-100 camera (used for the PGF), I proposed the theory that it was not a 25mm lens on Roger's camera. Once John offered his recollection of using the Keystone camera (which had a 25mm Cine Raptor lens on it) the similarity of landscapes between the PGF and John's McClarin filming suggested that Roger's lens must be nearly identical to John's. This resulted in a restored belief that there was a 25mm lens on Roger's camera.

But the 25mm lens remained problematic. Now, with this analysis eliminating John's Keystone camera with a 25mm Cine Raptor lens as the filming camera for the McClarin walk, we are back to the question of what lens was used. So once again, we must use optics to try and solve the lens issue, but this time, we have two footage sequences to apply the optical study toward.

Discrepancies Between Footage and a 25mm Specification

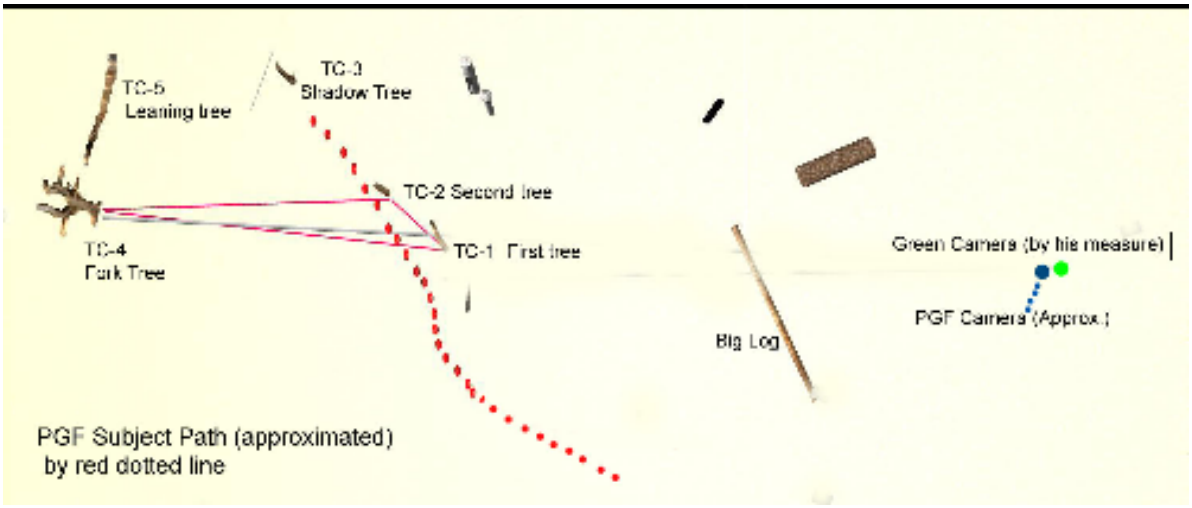
There are three issues of discrepancy with the 25mm lens specification being studied. They are described as follows:

Discrepancy #1

One discrepancy with the 25mm lens specification is McClarin's path as calculated by the lens formula.

The charts to follow show the principle concern if a 25mm lens was on Green's camera (and something very close was on the PGF). Green's camera position in this chart is based on John's own site visit and site measurements when he took the film. The basic Bluff Creek center trees are scaled to John's measurements (as well as Dahinden's measurements, and some interpolations for TC-3 and TC-5).

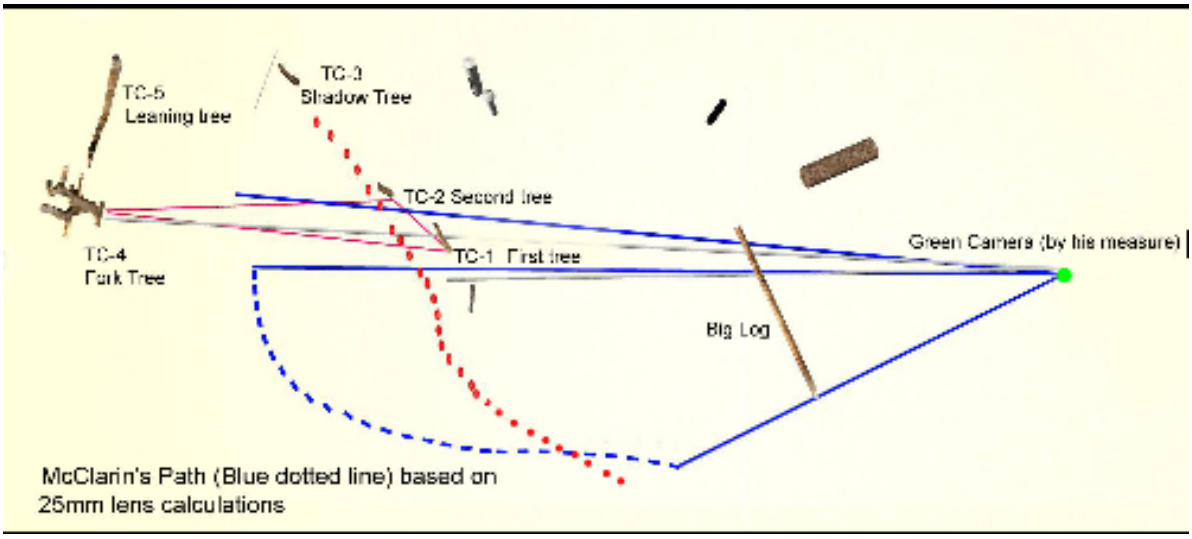
The first diagram shows the estimation of the PGF subject's path, based on movement across screen (compared to fixed landscape objects), diminishing size, and approximate body angle to camera. The path was aligned to the landscape by the close proximity to tree TC-2, because the subject passes that tree so close that the sun's shadow of the tree falls on the subject's back before the subject even gets fully past the tree.



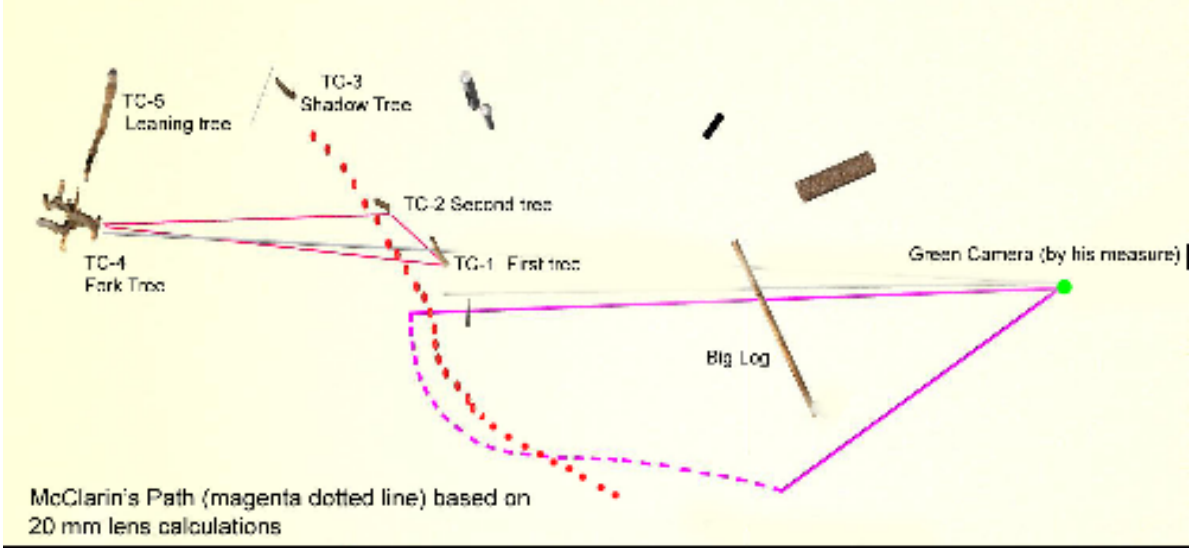
Now I must remind the reader that McClarin is reported to have gone to the site shortly after the filming of the PGF was announced, and he walked the path of remaining footprints as part of his site inspection. So he was familiar with the trackway path on that basis.

Returning to Bluff Creek the following summer with John Green, McClarin would be expected to recall the trackway path well enough to get close to it in his filmed walk.

In the chart below, we calculate McClarin's path from Green's camera position, based on a 25mm lens specification and the lens formula calculating his distance based on his known body height. The calculated path he walked is the blue dotted line, and it diverges considerably from the estimated PGF path.



The last chart below shows a potential McClarin path using a 20mm lens calculation. That path calculation is quite close to the PGF subject path, certainly far closer than the path determined by a 25mm lens specification.



This of itself isn't proof of a 20mm lens having been used on John's Camera. But it does provide enough "probable cause" to test the 20mm lens, and likewise, test the 25mm lens path to see if one can be excluded.

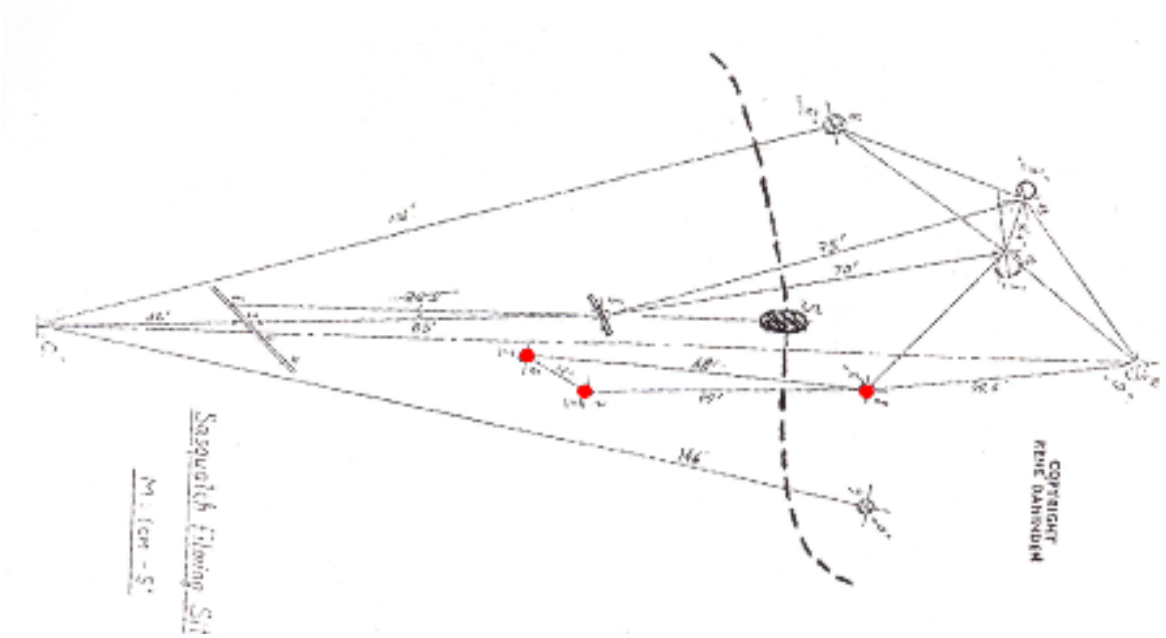
The 15mm lens, which I originally proposed as a solution, will calculate McClarin as walking amid the foreground debris and in front of the trees TC-1 and TC-2, which is contrary to the evidence in the film. So on that basis, the 15mm lens is now excluded as an option to consider further. If it could (hypothetically) be shown that John Green was significantly closer than his own measurements indicate, the 15mm lens option would again become a viable option to evaluate.

Discrepancy #2

In theoretical modeling, the path calculated by the 25mm lens specification seems to produce some steps in the path greater than a man can do, walking as McClarin did. Digital modeling can show extreme strides being taken, but cannot actually tell us if a man of McClarin's height can walk those steps. And if he can, the digital model won't tell us how much discrepancy there may be between McClarin's walking posture and a test subject. Only a live filmed walk will conclusively settle this, and such a test is being planned.

Discrepancy #3

Another theoretical modeling takes the basic site measurements of Green and Dahinden and constructs a triangle of three trees, as described by Dahinden (58', 49' and 12' apart for the three distances) to construct a triangle. The Dahinden measurement chart is below, with the three trees forming the triangle marked with red dots. They will be rotated 180 degrees in the subsequent charts.



Then using Green's 105' and 115' for measurements to two of the three trees from his position, we can create additional geometry to locate his camera.

DISCLAIMER: In the past, when I have showed these site measurements of Dahinden and Green, some people have taken the numbers into a CAD software program and got results that made them doubt the analysis.

The error was actually that in doing so, they failed to realize that these measurements by both men are, apparently, rounded to the foot, and thus are not precise in inches or fractions of an inch, as a CAD analysis would be.

So this disclaimer is included simply to caution people that the site measurement numbers are presumed to have been rounded to the foot, and thus could be off by several inches. That is why I did the 11 Case Studies, starting with first the five numbers pure and exact (which failed) and then tested 10 variations with slight adjustments of one or two numbers to show what will work.

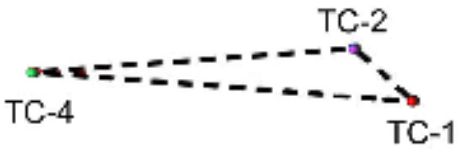
I have also seen examples of people trying to say my analysis is flawed because the measurements are "unreliable", not sufficiently precise compared to the level of precision we could achieve today if we did a site measurement. True, the numbers are not as precise as today's technology could achieve, but still, it is important to acknowledge that there has not been any credible offering of proof that the measurements are worthless. They are just "rough" by today's level of measuring precision, and some error correction is needed.

So please take that into consideration in any evaluation of the measurements and determinations from them.

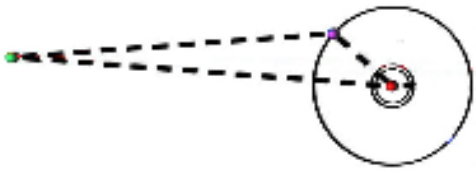
This model was tested with 11 different specifications of distances, because the five pure (exact) numbers failed to deliver a solution which has the camera's line of sight correct. The 11 cases are shown and described in APPENDIX 2, in Part Two of this document.

The following chart shows how the case study was set up.

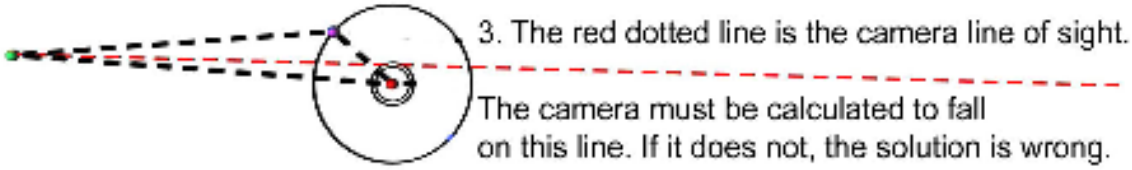
Diagramming the Site Angle Analysis - Key to the illustration components.



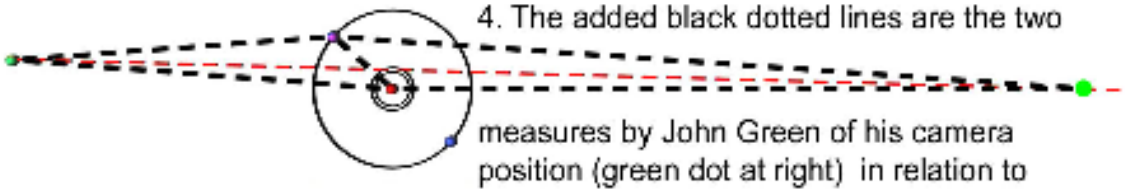
1. At left is the "Dahinden Triangle", shapes from Rene Dahinden's site measurements that included these three trees. The three measures are 58', 49' and 12'.



2. The black rings are to establish where the rear tree, TC-4 (the forked tree) can be seen through the other two (TC-1 and TC-2). The final calculated camera position must be on this line of sight, as evidenced by the films.



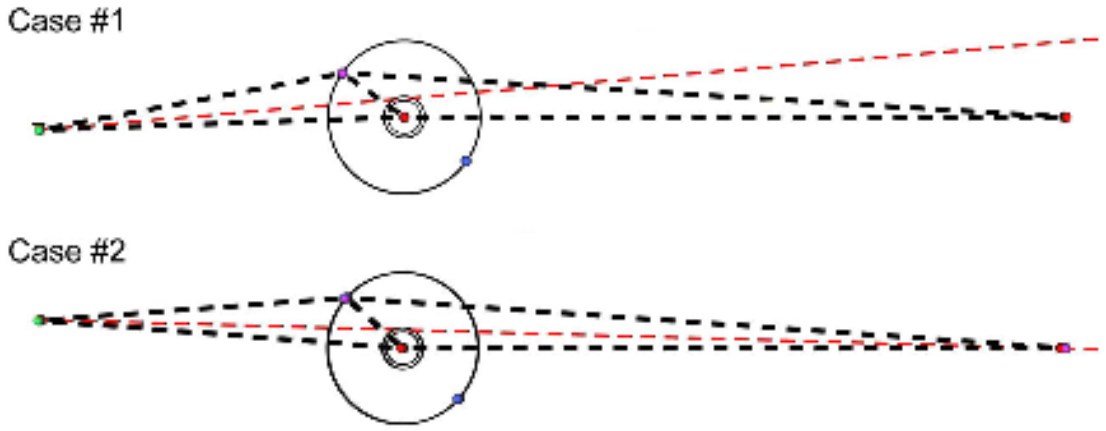
3. The red dotted line is the camera line of sight. The camera must be calculated to fall on this line. If it does not, the solution is wrong.



4. The added black dotted lines are the two measures by John Green of his camera position (green dot at right) in relation to trees TC-1 and TC-2.

Using this basic structure, 11 different combinations of site measurements and angles were tested, described in detail in the "Case Studies", Appendix 2.
chart by Bill Munns - January 2011

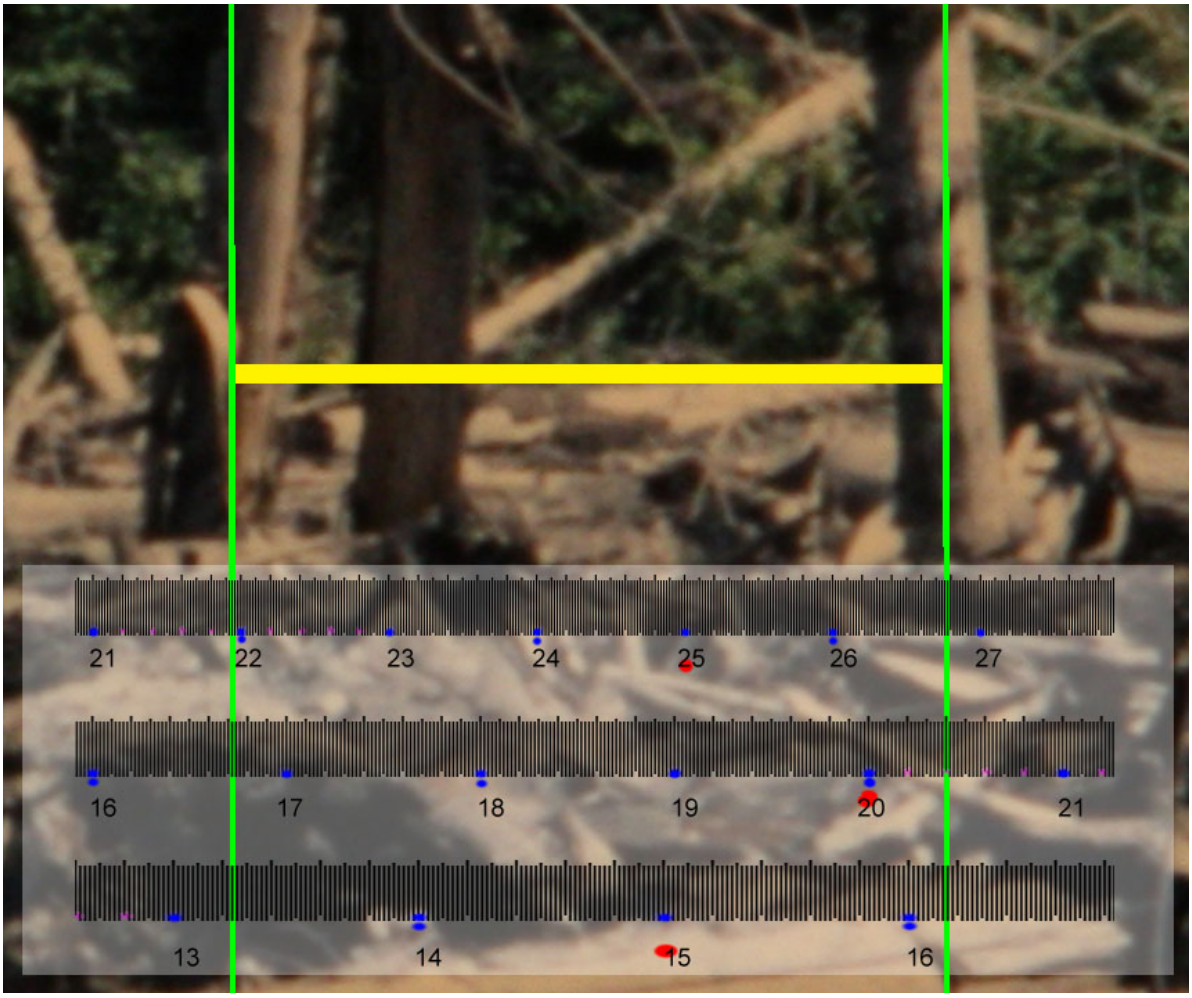
As examples, Case #1 and Case #2 are now shown.



Case #1 uses all five numbers as pure or exact numbers, and in doing so, they put Green's camera far off the correct line of sight. So the pure exact numbers make an impossible solution. But the numbers are not presumed to be pure and exact. They are assumed to have been rounded to the foot and off by a few inches, so we must test model variations of this diagram with minor errors of measure to see if any patterns emerge.

Please see Appendix 2 (in Release Part Two) for the full study and description.

Then (in the next chart, below) we measure the distance between the trees TC-1 and TC-2, using a frame width angle measure calibrated for a 25mm lens, a 20mm lens, and a 15mm lens.



The top measure bar is for a 15mm lens. The center measure is for a 20mm lens, and the lower bar is for a 25mm lens. We are measuring the left and right green vertical lines, and the horizontal yellow line shows the height at the measure, since the trees both lean somewhat.

The angles (from center of TC-1 to TC-2) are:

15mm	4.85 degrees
20mm	3.68 degrees
25mm	2.94 degrees

There is a margin of error for where the tree is measured because the trees leans a bit (and we don't know at exactly which part of the tree trunk either man measured to), so consider these angles approximate. The measure point I used is marked in the yellow line.

If we apply Occam's razor (the simplest solution is the more likely), then Case 2 (detailed in Appendix 2, in Part Two of this document) appears to be the simplest solution, because it has only one error to correct (lengthening the 105' measure) and it intriguingly reduces the discrepancy between Green's 162' measure to the TC-4 tree, which should be greater when you add his 105' measure to Dahinden's 58' measure and get 163'. Case #2 specifies an error of the

105' segment being increased to 105.762' (an error of 0.725%) and it gives an angle of 3.97, which is slightly wider than the 20mm specification of 3.68 degrees.

For a 25mm lens, the diagram estimates an angle of 2.94 degrees, far below the 3.97 found in the Case #2 good match diagram. Again, this is not yet conclusive, but certainly offers "probable cause" to give more attention to 20mm lens studies and tests, as well as more cause to exclude the 25mm lens. Please see the Appendix 2 (in Part Two) for the full evaluation.

So this issue is still a work in progress, to see if the 25mm lens specification can be excluded from consideration.

Since the 20mm lens specification provides a good enough path match to warrant further investigation, we go to the question of cameras and lenses.

What Camera Could Have Been Used?

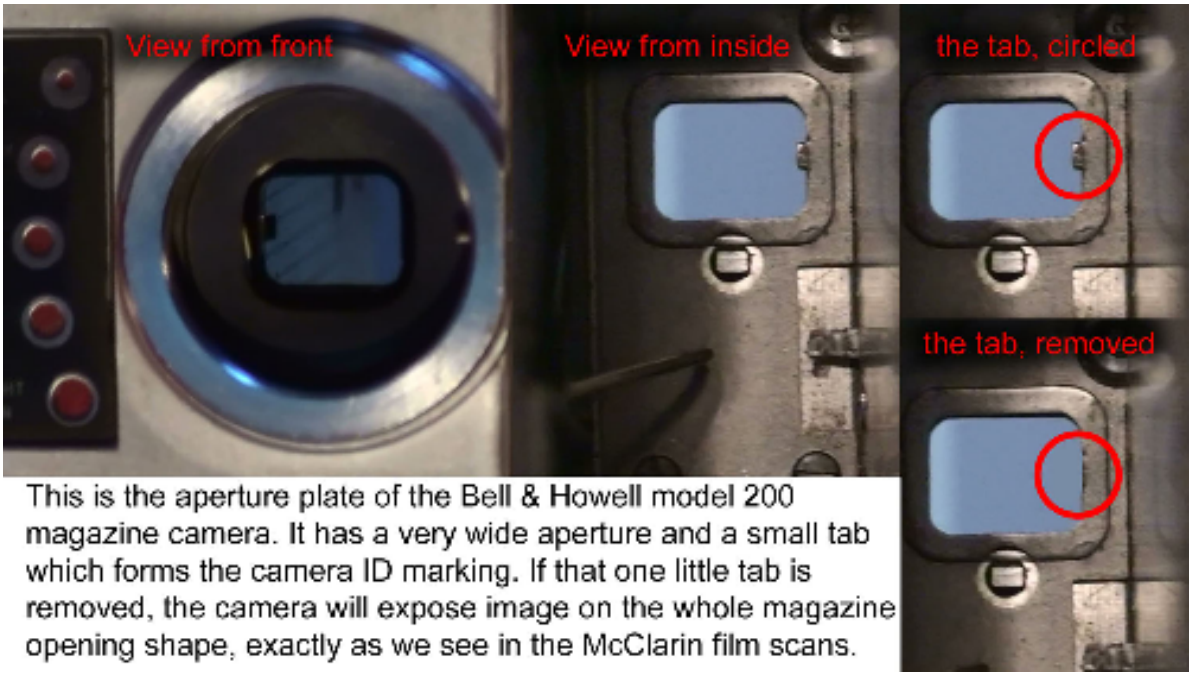
Thus far, in my research, the most likely camera to be used for McClarin's filming is a Bell & Howell 16mm magazine camera, model 200, shown below:

It comes with a 20mm Super Comat lens. The reason this is the most likely camera is because this appears to be the camera which can be converted to an "Ultra 16mm format" with the least effort and least machining skill. It has an oversized aperture window inside it, and instead of a notch or punched shape, it has a small tab that goes into the image side area, to form the ID marking.

As such, all you need to do to make it an "Ultra 16mm" camera is to grind off that one small tab, with something like a Dremel rotary tool and a fine metal grinding bit, and a shop vac hose in the

magazine interior (to suck up the ground metal dust so it doesn't get into the shutter mechanism). You don't need to take the camera apart to work on the aperture plate tab.

The next image, below, shows the aperture plate, the tab, and how it would look with that tab ground off.



This is the aperture plate of the Bell & Howell model 200 magazine camera. It has a very wide aperture and a small tab which forms the camera ID marking. If that one little tab is removed, the camera will expose image on the whole magazine opening shape, exactly as we see in the McClarin film scans.

So this camera is a magazine type, it has the easiest potential for conversion to "Ultra 16mm" and it has a 20mm lens as the standard, making it an exceptionally good prospect for filming McClarin.

Problems with PGF Lens

What lens is on the K-100 that filmed the PGF?

If it proves true that McClarin was indeed filmed with a camera that had a 20mm lens on it, then we need a lens of 20mm or very close to it on the PGF camera as well.

The closest option listed in my American Cinematographer Manual (Second Edition, 1966) is a 20mm Baltar lens. I am still investigating its mounts (we need a "C" mount lens), and if I can locate any, I will do filming tests on a K-100 camera. I have also identified a Som Berthiot 20mm F1.5 lens, and a Kodak Anastigmat 20mm lens as options. There may be other lens options, but I haven't verified any as of yet.

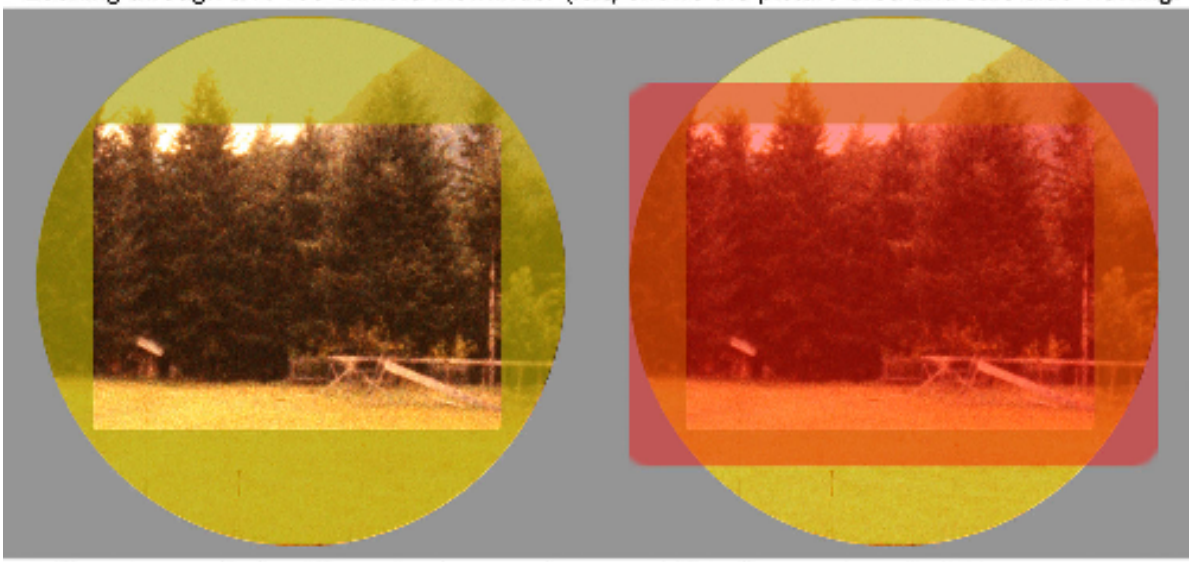
If it proves to be correct that John used something like a Bell & Howell camera with a 20mm Comat lens, then the PGF camera must have a lens on it that is slightly under 20mm in effective

focal length. But the 15mm lenses that Kodak makes, the 15mm Ektar or the 15mm Anastigmat, are too wide and can't be the lens. The problem is that since Kodak didn't list the above 20mm Anastigmat lens in the usual lens inventory for a Kodak K-100 camera, I cannot yet confirm if Kodak made a 20mm viewfinder companion lens. So if not, and this 20mm spec proves to be true, then we must wonder why Roger put a lens on his PGF camera for which he didn't have a correct companion viewfinder lens.

Now, first, purely from a mechanical standpoint, you can put any "C" mount lens on a Kodak K-100 camera, and it should take a fine picture and the lens should perform to (or close to) spec. So this certainly could be done. The question is not "Can it be done?" (because it can), but rather the question is "Why would it be done?" Why would a cameraman put a lens on his camera for which he does not have an equal companion viewfinder lens?

The Kodak K-100 camera has a round viewer, and a marked frame area on the ground glass, so the camera operator can see what's in frame, as well as see things just outside the edge of the frame. The chart below shows this, at left (simulated for illustrative purposes)

Looking through a K-100 camera viewfinder (left) shows the picture area and safe side viewing.



A 20mm lens, with the 25mm viewing eyepiece, would film the area in red, right.

Now, if you put a 20mm lens on the K-100, but keep the 25mm viewing lens, the camera actually films all that is seen in the red frame shape (approximated, for illustrative purposes), above right. You lose the corners in your viewer, so you don't see everything the camera actually gets on film, but still see most of your frame. But there's no safety area to the sides of frame.

It was this very consideration that made me move to the 15mm Kodak lens as an option when I first found problems with the 25mm lens spec. I figured a cameraman would want a lens on his camera for which he had a correct companion viewfinder lens (the 15mm did). But the 20mm lens will work on the K-100, and you can still use the 25mm viewer lens (since Kodak doesn't make a 20mm viewer lens for the K-100 camera). It seems odd to me, if in fact Roger did this, but the PGF story is filled with odd things. so I guess one more won't make a big difference.

But now, if this 20mm lens on camera proves correct, the whole PGF saga takes another curious detour from logic. Why did Roger set up his camera this way? It could actually be as simple as saying Roger wanted a somewhat wider lens than the 25mm for more scenic filming shots, and felt comfortable working with the adjusted viewfinder allowances he had to make while looking through it. But regretfully, with Roger gone, we will never know.

Arguments of No Documentation in Camera Equipment

A frequent challenge to theories of a lens other than the stock 25mm on the PGF camera often come in the form of documentation claims, specifically that there is (apparently) some documentation specifying Patterson rented the K-100 camera with a 25mm lens on it. And there is no documentation of other lenses being bought or rented.

The failure of this challenge is that we know Patterson was making a documentary throughout the year (1967) and we have samples of his footage scanned for analysis. That footage shows Patterson used at least 2 different cameras (a K-100 and one as yet unidentified), and at some time, both cameras had a zoom lens on them (as determined by the zooming images scanned and studied). So we know for a certainty that Patterson had one camera and one or two zoom lenses to use, for which there is no documentation. I say "one or two" because for the unidentified camera, I don't know the lens mount, but with the K-100, we know it is a "C" mount. If the other camera was something like a Bolex with "C" mount, then one "C" mount zoom lens could be put on both cameras. If the other camera is a "D" mount, two separate zoom lenses would be needed.

This conclusively shows that a lack of documentation is no cause to exclude any consideration of cameras, lenses or other equipment Patterson had that year (which includes his October Bluff Creek trip when the PGF was taken). We must rely on optical analysis to determine what equipment Patterson had and used, not documentation of rentals, because the rental paperwork is not complete and has obvious known omissions.

So specifications of equipment, particularly cameras and lenses, must be determined by optical analysis of the film footage, and those determinations prevail over any documentation like rental receipts, which only document possession of equipment, not use of it.

This ends Part One of this release. It is continued in a second PDF document for Part Two, which does now explain how the PGF and McClarin filmings should be compared. Part Two also includes the Appendix sections #1, #2 and #3.

Released January 22, 2011

Bill Munns Part One of Two Documents.